

*BUILDING DESIGN FOR HOMELAND SECURITY*

# Unit V

## Risk Assessment/ Risk Management



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# Unit Objectives

**Explain** what constitutes risk.

**Evaluate** risk using the Threat-Vulnerability Matrix to capture assessment information.

**Provide** a numerical rating for risk and justify the basis for the rating.

**Identify** top risks for asset – threat/hazard pairs that should receive measures to mitigate vulnerabilities and reduce risk.



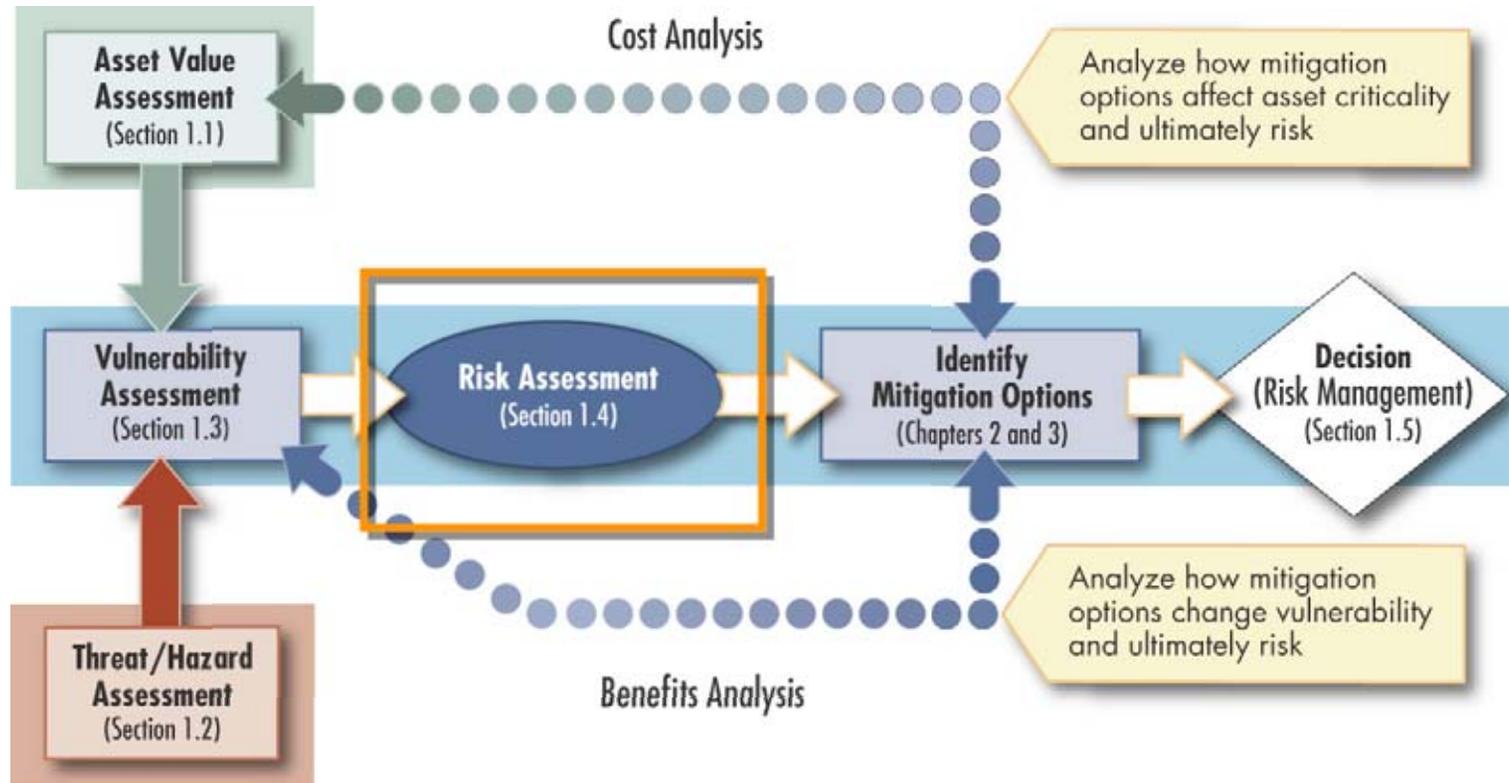
# Risk Management

**Risk management is the deliberate process of understanding “risk”** – the likelihood that a threat will harm an asset with some severity of consequences – and deciding on and implementing actions to reduce it.

**GAO/NSIAD-98-74: Combating Terrorism** – Threat and Risk Assessments Can Help Prioritize and Target Program Investments, April 1998



# Assessment Flow Chart



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# Definition of Risk

Risk is a combination of:

- The probability that an event will occur, and
- The consequences of its occurrence

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176

**Risk = Asset Value x Threat Rating x Vulnerability Rating**



Table 1-19: Definition of Risk, page 1-38

# Quantifying Risk

## Risk Assessment

Determine Asset Value

Determine Threat Rating Value

Determine Vulnerability Rating Value

Determine relative risk for each threat against each asset

***Select mitigation measures that have the greatest benefit/cost for reducing risk***



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# An Approach to Quantifying Risk

**Risk = Asset Value x  
Threat Rating x  
Vulnerability Rating**

Table 1-18: Risk Factors Definitions

Very High	10
High	8-9
Medium High	7
Medium	5-6
Medium Low	4
Low	2-3
Very Low	1

Table 1-19: Total Risk Color Code

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176



# Critical Functions

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
<b>Administration</b>	<b>280</b>	<b>140</b>	<b>135</b>	<b>90</b>
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating	7	7	9	9
<b>Engineering</b>	<b>128</b>	<b>160</b>	<b>384</b>	<b>144</b>
Asset Value	8	8	8	8
Threat Rating	8	5	6	2
Vulnerability Rating	2	4	8	9



Extracted from Table 1-20: Site Functional Pre-Assessment Screening Matrix, page 1-38

# Critical Infrastructure

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
<b>Site</b>	<b>48</b>	<b>80</b>	<b>108</b>	<b>72</b>
Asset Value	4	4	4	4
Threat Rating	4	4	3	2
Vulnerability Rating	3	5	9	9
<b>Structural Systems</b>	<b>24</b>	<b>32</b>	<b>240</b>	<b>16</b>
Asset Value	8	8	8	8
Threat Rating	3	4	3	2
Vulnerability Rating	2	4	8	9



Extracted from Table 1-21: Site Infrastructure Systems  
Pre-Assessment Screening Matrix, page 1-40

# Risk Assessment Results

Function	Cyber Attack	Armed Attack (single gunman)	Vehicle Bomb	CBR Attack
<b>Administration</b>	280	140	135	90
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating	7	7	9	9
<b>Engineering</b>	128	128	192	144
Asset Value	8	8	8	8
Threat Rating	8	4	3	2
Vulnerability Rating	2	4	8	9
<b>Warehousing</b>	96	36	81	54
Asset Value	3	3	3	3
Threat Rating	8	4	3	2
Vulnerability Rating	4	3	9	9
<b>Data Center</b>	360	128	216	144
Asset Value	8	8	8	8
Threat Rating	9	4	3	2
Vulnerability Rating	5	4	9	9
<b>Food Service</b>	2	32	48	36
Asset Value	2	2	2	2
Threat Rating	1	4	3	2
Vulnerability Rating	1	4	8	9
<b>Security</b>	280	140	168	126
Asset Value	7	7	7	7
Threat Rating	8	4	3	2
Vulnerability Rating	5	5	8	9
<b>Housekeeping</b>	16	64	48	36
Asset Value	2	2	2	2
Threat Rating	8	4	3	2
Vulnerability Rating	1	8	8	9
<b>Day Care</b>	54	324	243	162
Asset Value	9	9	9	9
Threat Rating	3	4	3	2
Vulnerability Rating	2	9	9	9

\* NOTIONAL DATA INSERTED FOR DEMONSTRATION PURPOSES.



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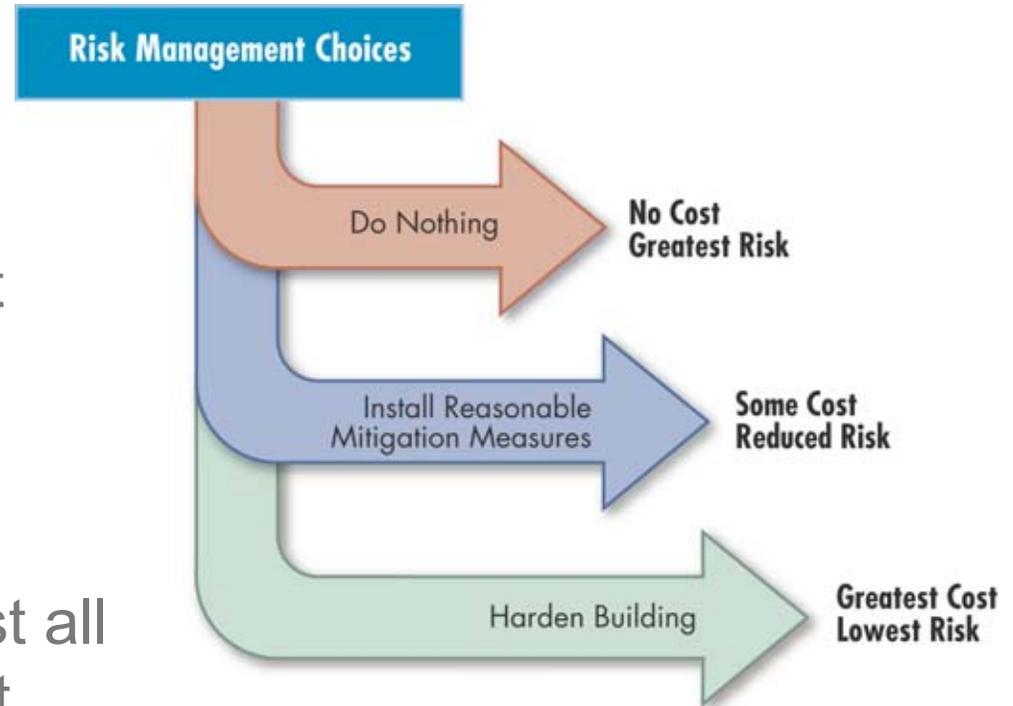
# Selecting Mitigation Measures

## Three Options:

Do nothing and accept the risk.

Perform a risk assessment and manage the risk by installing reasonable mitigation measures.

Harden the building against all threats to achieve the least amount of risk.



# Mitigation Measures

A mitigation measure is an action, device, or system used to reduce risk by affecting an asset, threat, or vulnerability.

**Mitigation Measures can be:**

- **Procedures**
- **Equipment**
- **Personnel**
- **Capital Investment**



# Measures to Reduce Risk

## THREATS

Deter

Detect

Deny

Devalue

***Affect the threat posed by the adversary***

## ASSETS

Relocate

Reduce assets

Plan for recovery

Insure

***Reduce the impact on the assets***

## VULNERABILITIES

Conceal

Reduce

Eliminate

***Affect the degree of vulnerability***



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# Achieving Building Security: Planning Factors

Building security integrates multiple concepts and practices.

Objective is to achieve a balanced approach that combines aesthetics, enhanced security, and use of non-structural measures.



# Process Review

**Calculate** the relative risk for each threat against each asset

**Identify** the high risk areas

**Identify** Mitigation Options to reduce the risk



# Summary

Risk Definition

Critical Function and Critical Infrastructure Matrix

Numerical and color coded risk scale

Identify Mitigation Options



# Unit V Case Study Activity

## Risk Rating

### Background

Formula for determining a numeric value risk for each asset-threat/hazard pair:

**Risk = Asset Value x Threat Rating x Vulnerability Rating**

### Requirements: Vulnerability Rating Approach

Use worksheet tables to summarize HIC asset, threat, and vulnerability assessments conducted in the previous activities

Use the risk formula to determine the risk rating for each asset-threat/hazard pair for:

- Critical Functions
- Critical Infrastructure

